



MARINE POWER DISTRIBUTION

SWITCHGEAR & CIRCUIT BREAKERS

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EXCEPTIONAL ENGINEERING, PROVEN SOLUTIONS

Leonardo DRS combines exceptional engineering capability with a long history of successfully fielded products to deliver proven solutions. Our switchgear and circuit breakers are the natural choice for critical applications specified for the U.S. Navy and other maritime applications. MIL-STD naval specifications are only the start.

Leonardo DRS products are battle-tested and hardened, having proven themselves time and again, providing continuous, flawless operations in the harshest environments.

Leonardo DRS commands a 100+ year service record other providers can only envy. Our products have been fielded on every U.S. Navy combatant since World War II.

Leonardo DRS products are also ever evolving as our company looks to future Navy needs, with innovative products.

Leonardo DRS delivers. As we develop innovations and improvements, we incorporate the very best ideas across product lines and through successive product iterations



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SWITCHBOARDS



Our switchboards are designed to withstand rugged environments that require significant up-time, high mean time between failures and low mean time to repair. Compliance with marine standards including MIL Specs is a standard feature of these switchboards. Leonardo DRS switchboards are the natural choice for critical applications specified for the U.S. Navy and other maritime applications.

The Leonardo DRS switchboards have been installed on a wide base of legacy platforms and the latest U.S. Navy combatants.

- The Leonardo DRS Medium Voltage Switchboards are installed on the Ford Class CVN, America Class LHA, Arleigh Burke Flight III DDG and the Columbia Class SSBN ships.
- The Leonardo DRS Low Voltage Switchboards are installed on the Ford Class CVN, America Class LHA, San Antonio Class LPD, Blue Ridge Class LCC, Freedom Class LCS, Zumwalt Class DDG ships and the Virginia Class NSSN.



4160V MEDIUM VOLTAGE SWITCHBOARD

Leonardo DRS offers a complete line of metal enclosed 4160V switchboards fully customizable to meet the power needs of any customer with stringent requirements.

FUNCTIONAL RATINGS

- Main Bus Rating: 2000A
- Voltage Rating: 4160V, 60Hz, 3-phase
- Withstand Rating: 40 kA rms, symmetrical
- Basic Impulse Level: 60kV
- Dielectric Withstand: 19kV
- Enclosure Drip Proof: 15°
- Complementation: Metal Enclosed
- Cable Entry: Bottom Only
- Designed for Leonardo DRS Vacuum Circuit Breakers

FEATURES

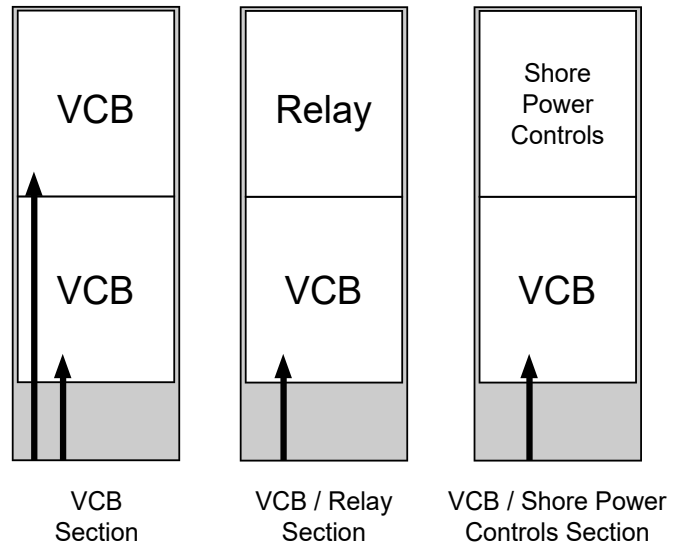
- VCB Control Power Features
- 120 VAC Uninterruptable Power Supply (UPS)
- Local Breaker Controls
- Fuse Protection
- Protective Relays with Monitoring
 - Overcurrent
 - Over/Under Voltage
 - Over/Under Frequency
 - Reverse Power
 - Other-Contact Factory
- Thermal Inspection Viewport
- Bus Line Grounding Points
- Anti-Condensation heaters
- Designed for the Life of the Ship

OPTIONS

- Low-voltage fuses protecting all internal devices as well as control power transformers
- Potential transformers, ground fault detection, current transformers, and interposing relays for breaker control outputs
- Generator controls
- Integrated power feeds for specialized loads



The upper and lower section of each vertical section is customizable. Below is a sample of the available switchboard configuration options. Contact the factory for other configurations.



Bottom Cable Entry Unit Dimensions
All Sections 81" H X 54" D X 24" W

MILITARY SPECIFICATIONS

- MIL-DTL-32483
- MIL-DTL-901, Grade A, Class I/II
- MIL-STD-167-1
- MIL-STD-461



13.8KV MEDIUM VOLTAGE SWITCHBOARD

Leonardo DRS offers a complete line of metal clad 13.8 kV switchboards fully customizable to meet the power needs of any customer with stringent requirements.

FUNCTIONAL RATINGS

- Main Bus Rating: 2000A
- Voltage Rating: 13.8kV, 60Hz, 3-phase
- Withstand Rating: 40 kA rms, symmetrical
- Basic Impulse Level: 95kV
- Dielectric Withstand: 36kV
- Enclosure Drip Proof: 15°
- Complementation: Metal Clad
- Cable Entry: Top and Bottom
- Designed for Leonardo DRS Vacuum Circuit Breakers

FEATURES

- VCB Control Power Features
- 120 VAC Uninterruptable Power Supply (UPS)
- Local Breaker Controls
- Fuse Protection
- Protective Relays with Monitoring
 - Overcurrent
 - Over/Under Voltage
 - Over/Under Frequency
 - Reverse Power
 - Other-Contact Factory
- Bus Line Grounding Points
- Anti-Condensation heaters
- Designed for the Life of the Ship

OPTIONS

- Low-voltage fuses protecting all internal devices as well as control power transformers
- Potential transformers, ground fault detection, current transformers, and interposing relays for breaker control outputs
- Generator controls
- Integrated power feeds for specialized loads

MILITARY SPECIFICATIONS

- MIL-DTL-901, Grade A, Class I/II
- MIL-STD-167-1
- MIL-STD-461



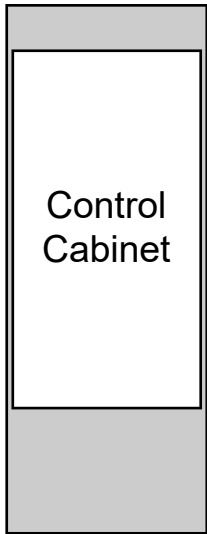
The upper and lower section of each vertical section is customizable. On the next page is a sample of the available switchboard configuration options. Contact the factory for other configurations.



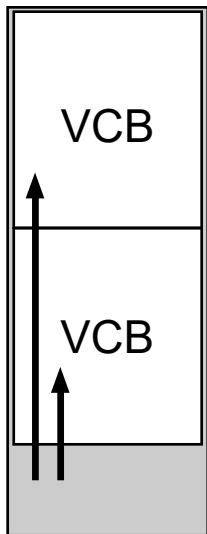
13.8KV MEDIUM VOLTAGE SWITCHBOARD, PAGE 2

Bottom Cable Entry Unit Dimensions

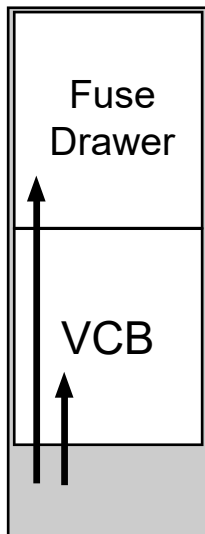
Control Section 81" H x 49" D x 32" W
 All other Sections 81" H x 84" D x 32" W



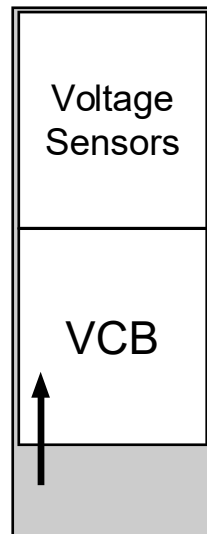
Control Section



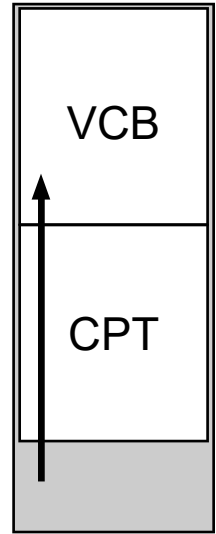
VCB Section



VCB / Fuse Section



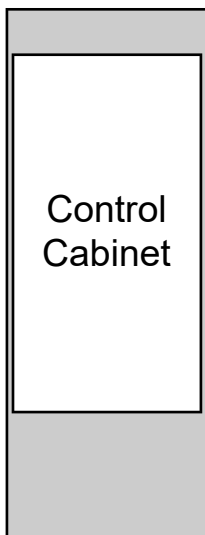
VCB / Bus Voltage Sensor Section



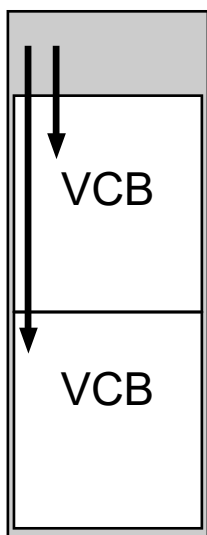
VCB / Control Power Transformer Section

Top Cable Entry Unit Dimensions

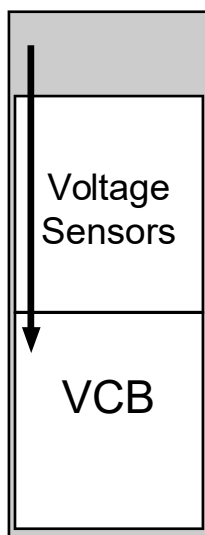
Control Section 81" H x 49" D x 32" W
 All other Sections 81" H x 73" D x 32" W



Control Section



VCB Section



VCB / Bus Voltage Sensor Section



450V LOW VOLTAGE SWITCHBOARD

Leonardo DRS offers a complete line of 450V switchboards fully customizable to meet the power needs of any customer with stringent requirements.

FUNCTIONAL RATINGS

- Main Bus Rating: up to 4000A
- Voltage Rating: 450V, 60Hz, 3-phase
- Withstand Rating: 85kA rms, symmetrical (100 kA can be achieved with additional bracing)
- Enclosure Drip Proof: 15°
- Cable Entry: Top and Bottom

FEATURES

- ACB Control Power Features
- Local Breaker Controls
- Fuse Protection
- Designed for the Life of the Ship

OPTIONS

- Control power
- Air circuit breakers (ACB)
 - 500A to 4000A continuous
- Air Quenched Breakers (AQB)
 - 15A to 800A continuous
- Motor operators and protection
- Load shed functionality
- Ground Detection
- Network communication interfaces
 - MODBUS
 - PROFIBUS
- Generator controls
- Arc fault detection

MILITARY SPECIFICATIONS

- MIL-DTL-16036
- MIL-DTL-901, Grade A Class I/II
- MIL-STD-167-1
- MIL-STD-461

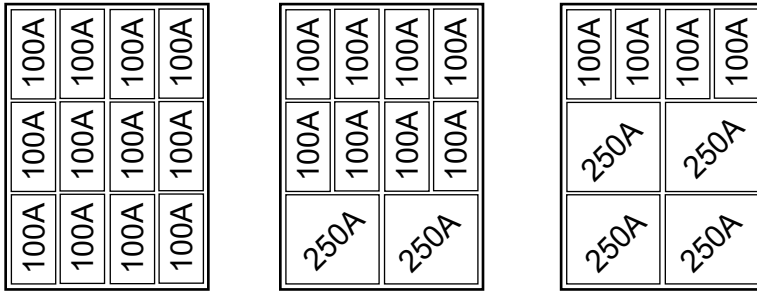


The upper and lower section of each vertical section is customizable. On the next page is a sample of the available switchboard configuration options. Contact the factory for other configurations.

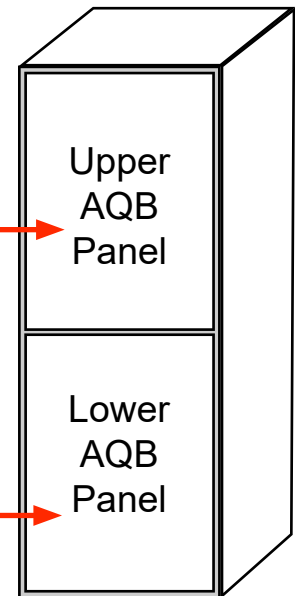
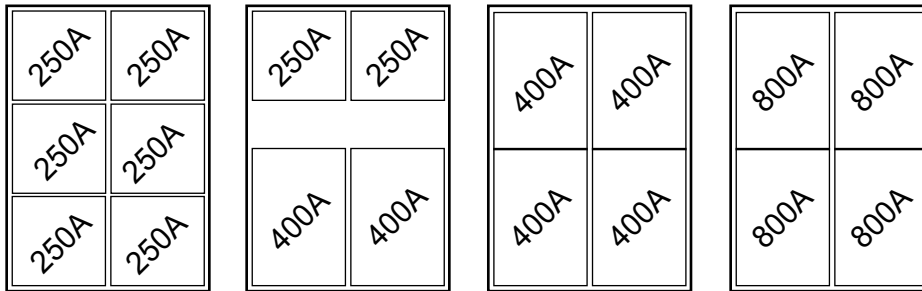


450V LOW VOLTAGE SWITCHBOARD, PAGE 2

Upper Narrow AQB Panel Configuration

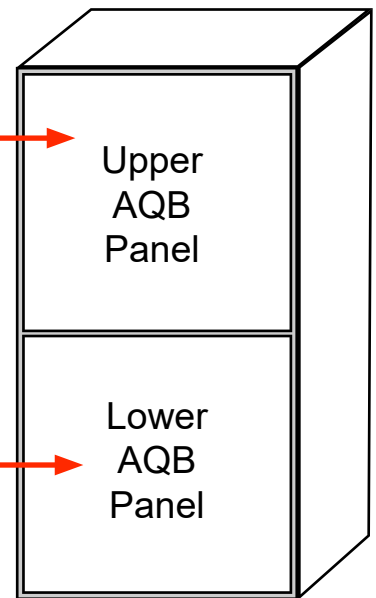
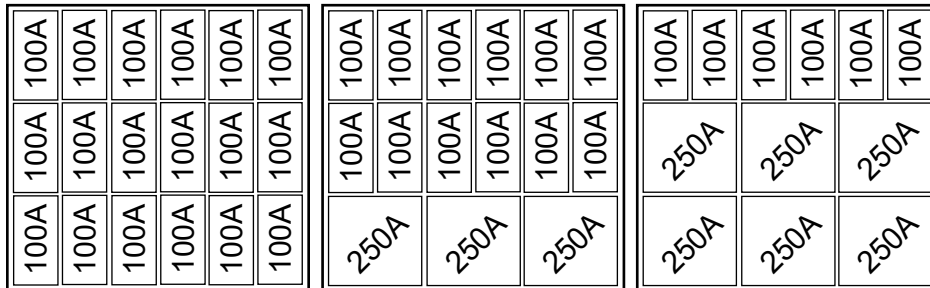


Lower Narrow AQB Panel Configuration



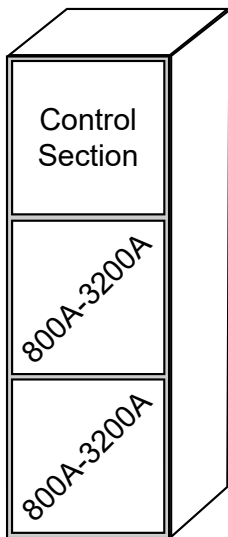
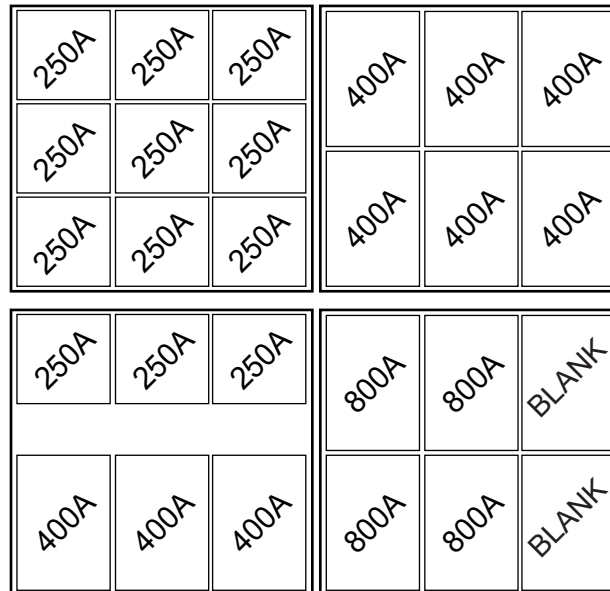
Narrow AQB Section
81" H X 33" D X 24" W

Upper Wide AQB Panel Configuration



Wide AQB Section
81" H X 33" D X 33" W

Lower Wide AQB Panel Configuration



ACB Section
81" H X 49" D X 25" W



VACUUM CIRCUIT BREAKERS (VCB)

Leonardo DRS Vacuum Circuit Breakers (VCB) are based on a COTS breaker that is militarized by DRS providing a small, lightweight, and cost-effective solution. Used on the latest U.S. Navy ships for power distribution, the military hardened VCBs are designed to withstand rugged Navy combatant conditions for the life of the ship.

The VCB vacuum interrupter design significantly reduces size and weight as arc chutes are not needed. Maintenance is reduced since no contact adjustments are required, only a periodic check of the integral wear indicators is needed. The VCBs are draw out (removable) for ease of inspection and replacement.

OPERATING RANGES

MSVCB-4.76kV-1600.....	4,760V @ 1600A
VCB-15kV-1600	15,000V @ 1600A

FEATURES

- Maintenance free vacuum interrupter
- Trip free operation
- Interlock capability for proper and safe operation
- Built-in contact erosion indicator
- Mechanical operations counter
- Closing springs charged indicator
- Electric open and close capability

MILITARY SPECIFICATIONS

- MIL-DTL-32485 (MSVCB-4.76kV-1600 Only)
- MIL-DTL-901, Grade A
- MIL-STD-167-1



MSVCB-4.76KV-1600 VACUUM CIRCUIT BREAKER

PHYSICAL CHARACTERISTICS

Width..... 18.4 inches
 Height..... 32.1 inches
 Depth..... 22.5 inches
 Weight (maximum).....380 lbs

ENVIRONMENTAL PERFORMANCE

Operating temperature..... -30 to +75 C
 Operating humidity 95% non-condensing

FEATURES

Operating Mechanism..... Electrical & Mechanical
 Shunt Trip Device..... Standard
 Mechanical Position Indicator Standard
 Mechanical Operations Counter Standard
 Auxiliary Switches-Quantity 15
 Auxiliary Switches.... 120VAC, 15A / 125VDC, 10 A
 Secondary Disconnect Pins50
 Cell Switch 120VAC, 15A

FUNCTIONAL RATINGS

(Ratings are nominal unless stated)

POWER CHARACTERISTICS:

Voltage..... 4,760V
 Dielectric Withstand 19,000V for 1 minute
 Basic Impulse Level (BIL)..... 60,000V
 Corona Extinction Voltage Level.....17,500V
 Maximum Continuous Current.....1,600A
 Maximum Voltage and Frequency 4,760VAC, 60Hz
 Maximum Interrupting Rating 41,000A symmetrical
 Rated Short Time Current106,600A peak
 Rated Short Time Current Duration..... ≥2 seconds
 Maximum Trip Time......50 milliseconds
 Maximum Close Time 100 milliseconds
 Mechanical Endurance.....5,000 cycles
 Number of Poles..... 3



FRAME AMPS	P/N Standard	P/N With Improved Racking
1600A	MC-034541-01	MC-034541-02



VCB-15KV-1600 VACUUM CIRCUIT BREAKER

PHYSICAL CHARACTERISTICS

Width..... 27.6 inches
 Height..... 32.2 inches
 Depth..... 25.1 inches
 Weight (maximum)..... 430 lbs

ENVIRONMENTAL PERFORMANCE

Operating temperature..... -30 to +75 C
 Operating humidity 95% non-condensing

FEATURES

Operating Mechanism.... Electrical & Mechanical
 Shunt Trip Device..... Standard
 Mechanical Position Indicator Standard
 Mechanical Operations Counter Standard
 Auxiliary Switches-Quantity 15
 Auxiliary Switches... 120VAC, 15A / 125VDC, 10 A
 Secondary Disconnect Pins 50
 Cell Switch 120VAC, 15A

FUNCTIONAL RATINGS

(Ratings are nominal unless stated)

POWER CHARACTERISTICS

Voltage..... 15,000V
 Dielectric Withstand 36,000V for 1 second
 Basic Impulse Level (BIL)..... 95,000V
 Corona Extinction Voltage Level..... 17,500V
 Maximum Continuous Current..... 1,600A
 Maximum Voltage and Frequency 15,000VAC, 60Hz
 Maximum Interrupting Rating 41,000A symmetrical
 Rated Short Time Current..... 103,000A peak
 Rated Short Time Current Duration..... ≥2 seconds
 Maximum Trip Time..... 50 milliseconds
 Maximum Close Time 100 milliseconds
 Mechanical Endurance..... 10,000 cycles
 Number of Poles..... 3



FRAME AMPS	P/N Standard	P/N With Improved Racking
1600A	45-1391	45-1391-2



AIR CIRCUIT BREAKERS (ACB)

Leonardo DRS Air Circuit Breakers (ACB) are a configurable (500A to 4000A) low voltage circuit breakers that utilizes the latest technology electronic trip units. The ACB is based on a COTS breaker that is militarized by DRS and provides a compact, lightweight, and cost-effective solution.

Whether for new shipbuilding or modernization programs, the Leonardo DRS ACB is ideal for integrated control, condition-based maintenance, power monitoring, and interfacing with ship network communications. The built-in electronic trip unit can be remotely accessed for diagnostics, status, ampere, voltage, and power monitoring.

Controls and indicators are functionally grouped on the ACB faceplate to optimize the human interface, visibility, and ease of use. For maximum safety, a modern, through-the-cover design permits access to the ACB racking mechanism, electronic trip unit, operational controls and status indicators with the cover installed.

FEATURES

- **Electronic trip unit with long, short, and instantaneous trip curve settings**
- **24-Character LED Display for Status**
- **System Diagnostics**
 - Cause of Trip
 - Trip Log
 - Waveform Capture
 - Breaker Health Monitor
 - Remote Signal Contacts
 - Programmable Contacts
 - Electronic Operations Counter

PROTECTIVE FEATURES

- Over Current
- Over Voltage
- Reverse Power
- Under Voltage
- Voltage Unbalance
- Ground Fault
- Over Frequency
- Under Frequency
- Phase Rotation



85KA INTERRUPTION AND 85KA WITHSTAND

Breaker Type	Continuous Current Rating
ACB-2020 (800A)	500A-800A
ACB-2020 (1000A)	640A-1000A
ACB-2020 (1200A)	800A-1200A
ACB-2020 (1600A)	1000A-1600A
ACB-2020 (2000A)	1280A-2000A
ACB-3220 (2000A)	1920A-2000A
ACB-3220 (3200A)	2400A-3200A

100KA INTERRUPTION AND 100KA WITHSTAND

Breaker Type	Continuous Current Rating
ACB-2022 (800A)	500A-800A
ACB-2022 (1000A)	640A-1000A
ACB-2022 (1200A)	800A-1200A
ACB-2022 (1600A)	1000A-1600A
ACB-2022 (2000A)	1280A-2000A
ACB-4026 (2000A)	1920A-2000A
ACB-4026 (3200A)	2400A-4000A

MILITARY SPECIFICATIONS

- MIL-DTL-17587
- MIL-DTL-901, Grade A
- MIL-STD-167-1



ACB-2020 AIR CIRCUIT BREAKER

PHYSICAL CHARACTERISTICS

Circuit Breaker (Removable Element)

Width..... 16.6 inches
 Height..... 18.2 inches
 Depth..... 17.5 inches
 Weight (maximum)..... 200 lbs

Cassette (Stationary Element)

Width..... 18.7 inches
 Height..... 20.8 inches
 Depth..... 17.5 inches
 Weight (maximum)..... 120 lbs

ENVIRONMENTAL PERFORMANCE

Operating temperature..... -20 to +70 C
 Operating humidity 95% non-condensing

FUNCTIONAL RATINGS

(Ratings are nominal unless stated)

POWER CHARACTERISTICS

Maximum Continuous Current..... 2,000A
 Maximum Voltage and Frequency 500VAC, 60Hz
 Maximum Interrupting Rating 85,000A symmetrical
 Rated Short Time Current..... 85,000A peak
 Rated Short Time Current Duration..... 0.5 seconds
 Number of Poles..... 3

ATTACHMENTS

Operating Mechanism..... Electrical & Mechanical
 Shunt trip device..... Standard
 Mechanical lockout device Standard
 Mechanical position indicator Standard
 Operations counter Standard
 Rack-in/rack-out position indicator Standard
 Under voltage release..... Optional
 Remote close function Optional
 Vertical bus stab adapters Optional
 Auxiliary Switches-Quantity 8
 Auxiliary Switches..... 120VAC, 15A / 480VAC, 5A
 Secondary Disconnect 8 @ 15A and 4 @ 10A
 Cell Switch 120VAC, 15A
 Indicator light..... N/A
 Hold-closed mechanism N/A
 Trip on power up (TOPU) device N/A



FRAME AMPS	P/N Standard	P/N With UVR	P/N Remote Close
800A	97-3600GR4	97-3600GR11	MC-008541-04
1000A	97-3600GR5	97-3600GR12	MC-008541-05
1200A	97-3600GR1	97-3600GR8	MC-008541-01
1600A	97-3600GR2	97-3600GR9	MC-008541-02
2000A	97-3600GR3	97-3600GR10	MC-008541-03

Cassette Horizontal Connections..... 97-3606GR5
 Cassette Vertical Connections..... 97-3606GR6



ACB-2022 AIR CIRCUIT BREAKER

PHYSICAL CHARACTERISTICS

Circuit Breaker (Removable Element)
 Width..... 16.6 inches
 Height..... 18.2 inches
 Depth..... 19.2 inches
 Weight (maximum)..... 225 lbs
 Cassette (Stationary Element)
 Width..... 19.5 inches
 Height..... 22.7 inches
 Depth..... 23.5 inches
 Weight (maximum)..... 140 lbs

ENVIRONMENTAL PERFORMANCE

Operating temperature..... -20 to +70 C
 Operating humidity 95% non-condensing

FUNCTIONAL RATINGS

(Ratings are nominal unless stated)

POWER CHARACTERISTICS

Maximum Continuous Current..... 2,000A
 Maximum Voltage and Frequency 500VAC, 60Hz
 Maximum Interrupting Rating ... 100,000A symmetrical
 Rated Short Time Current 100,000A peak
 Rated Short Time Current Duration 0.5 seconds
 Number of Poles..... 3

ATTACHMENTS

Operating Mechanism..... Electrical & Mechanical
 Shunt trip device..... Standard
 Mechanical lockout device Standard
 Mechanical position indicator Standard
 Operations counter Standard
 Rack-in/rack-out position indicator Standard
 Under voltage release..... Optional
 Remote close function N/A
 Vertical bus stab adapters Optional
 Auxiliary Switches-Quantity 8
 Auxiliary Switches..... 120VAC, 15A / 480VAC, 5A
 Secondary Disconnect 8 @ 15A and 4 @ 10A
 Cell Switch 120VAC, 15A
 Indicator light..... N/A
 Hold-closed mechanism N/A
 Trip on power up (TOPU) device N/A



FRAME AMPS	P/N Standard	P/N With UVR
800A	97-3601GR4	97-3601GR9
1000A	97-3601GR5	97-3601GR10
1200A	97-3601GR1	97-3601GR6
1600A	97-3601GR2	97-3601GR7
2000A	97-3601GR3	97-3600GR8

Cassette Vertical Connections..... MC-068175-01
 ACB-1600HR Retrofit MC-068154-01



ACB-3220 AIR CIRCUIT BREAKER

PHYSICAL CHARACTERISTICS

Circuit Breaker (Removable Element)

Width..... 16.6 inches
 Height..... 18.2 inches
 Depth..... 17.5 inches
 Weight (maximum)..... 200 lbs

Cassette (Stationary Element)

Width..... 18.7 inches
 Height..... 20.8 inches
 Depth..... 26.3 inches
 Weight (maximum)..... 210 lbs

ENVIRONMENTAL PERFORMANCE

Operating temperature..... -20 to +70 C
 Operating humidity 95% non-condensing

FUNCTIONAL RATINGS

(Ratings are nominal unless stated)

POWER CHARACTERISTICS

Maximum Continuous Current..... 3,200A
 Maximum Voltage and Frequency 500VAC, 60Hz
 Maximum Interrupting Rating 85,000A symmetrical
 Rated Short Time Current..... 85,000A peak
 Rated Short Time Current Duration..... 0.5 seconds
 Number of Poles..... 3

ATTACHMENTS

Operating Mechanism..... Electrical & Mechanical
 Shunt trip device..... Standard
 Mechanical lockout device Standard
 Mechanical position indicator Standard
 Operations counter Standard
 Rack-in/rack-out position indicator Standard
 Under voltage release..... Optional
 Remote close functionN/A
 Vertical bus stab adaptersN/A
 Auxiliary Switches-Quantity 8
 Auxiliary Switches..... 120VAC, 15A / 480VAC, 5A
 Secondary Disconnect 8 @ 15A and 4 @ 10A
 Cell Switch..... 120VAC, 15A
 Indicator light.....N/A
 Hold-closed mechanismN/A
 Trip on power up (TOPU) deviceN/A



FRAME AMPS	P/N Standard	P/N With UVR
2000A	97-3600GR13	97-3600GR14
3200A	97-3600GR6	97-3600GR7

Cassette Horizontal Connections..... 97-3606GR3
 ACB-3200HR/4000HR Retrofit.....MC-034868-02



ACB-4026 AIR CIRCUIT BREAKER

PHYSICAL CHARACTERISTICS

Circuit Breaker (Removable Element)

Width..... 27.3 inches
 Height..... 19.4 inches
 Depth..... 21.8 inches
 Weight (maximum)..... 404 lbs

Cassette (Stationary Element)

Width..... 29.7 inches
 Height..... 26.8 inches
 Depth..... 27.7 inches
 Weight (maximum)..... 1069 lbs

ENVIRONMENTAL PERFORMANCE

Operating temperature..... -20 to +70 C
 Operating humidity 95% non-condensing

FUNCTIONAL RATINGS

(Ratings are nominal unless stated)

POWER CHARACTERISTICS

Maximum Continuous Current..... 4,000A
 Maximum Voltage and Frequency 500VAC, 60Hz
 Maximum Interrupting Rating ... 100,000A symmetrical
 Rated Short Time Current.....100,000A peak
 Rated Short Time Current Duration..... 0.75 seconds
 Number of Poles..... 3

ATTACHMENTS

Operating Mechanism..... Electrical & Mechanical
 Shunt trip device..... Standard
 Mechanical lockout device Standard
 Mechanical position indicator Standard
 Operations counter Standard
 Rack-in/rack-out position indicator Standard
 Under voltage release..... Optional
 Remote close functionN/A
 Vertical bus stab adaptersN/A
 Auxiliary Switches-Quantity 8
 Auxiliary Switches..... 120VAC, 15A / 480VAC, 5A
 Secondary Disconnect8 @ 15A and 4 @ 10A
 Cell Switch..... 120VAC, 15A
 Indicator light.....N/A
 Hold-closed mechanismN/A
 Trip on power up (TOPU) deviceN/A



FRAME AMPS	P/N Standard	P/N With UVR
2000A	MC-052896-03	MC-052896-04
4000A	MC-052896-01	MC-052896-02

Cassette..... MC-055396-01
 ACB-3200/4000HR Retrofit..... MC-055396-01



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